

GLIDING BOARD AND METHOD FOR MANUFACTURE OF SUCH A

GLIDING BOARD

Technical Field

The invention concerns the field of snow
5 gliding sports. More particularly, it relates to a
novel structure for a gliding board, i.e. for an alpine
ski or derivatives such as a nordic ski, as well as for
snowboards. It relates more particularly to a novel
board structure and to an associated manufacturing
10 method, which make it possible to produce injected-core
boards whose upper face has pronounced relief effects
and whose internal structure includes rigid
reinforcements.

Prior Art

15 In general, gliding boards have a core which is
made either as a prefabricated element or by using
injection and molding operations, during which chemical
components are introduced into a mold and react so as
to expand in order to form the core in situ. More
20 precisely, this expansion takes place in the volume
defined between two outer layers, an upper one and a
lower one, which respectively form the protective upper
layer of the board and the gliding surface, as well as
lateral reinforcing elements that form some or all of
25 the edges. During the injection, and the expansion
which follows, these various elements are pressed
against the cavity and the lid of the mold.

In general, the mechanical properties of
injection-molded skis are directly linked with the use
30 of internal reinforcements, which generally have a high
rigidity. This type of reinforcement is generally made
either of metal or based on fiber materials, and
especially using laminates that may be based on glass
fibers. The choice of the materials, as well as the
35 dimensions of the reinforcement and the way it is
positioned inside the core, are crucial for obtaining
the desired mechanical characteristics.

As the core expands, it pushes outward all the
elements contained in the volume that it fills. All the

substantially flat reinforcements known to date are generally arranged either in contact with the layer that forms the gliding surface or the protective upper layer, optionally with the interposition of other specific reinforcements. In order to ensure that the reinforcement is positioned correctly during the injection operation, it is generally adhesively bonded beforehand onto the outer layer with which it comes in contact, which prevents this reinforcement from being displaced when the polyurethane foam moves.

A problem arises with gliding boards whose upper face is not strictly flat, but instead includes recesses or other protuberances. This is because, in this case, it is not possible for the rigid reinforcement to deform in order to adopt the outer shape of the board. A solution to this problem has been proposed by the Applicant in document FR 2 818 915. This solution consists in making openings inside the rigid reinforcement, in order to allow the protective upper layer to be deformed according to the desired volume but without excessively deforming the reinforcement itself. These openings may be complete openings, hence making it easy for the polyurethane foam to pass through. These openings may also be partial openings, so as to allow local deformation of the reinforcement which remains adhesively bonded under the protective upper layer.

These solutions have some drawbacks, however, since it is difficult to accurately limit the passage of the foam that constitutes the core. This sealing problem compromises the precision with which the shapes can be reproduced. Moreover, these solutions require the reinforcement to be located immediately below the protective upper layer. It may prove beneficial to position the reinforcement at an intermediate height, however, rather than directly below the protective upper layer or directly above the gliding surface.

Another solution that makes it possible to distance the reinforcement from the outer layers, which

is proposed by document FR 2 312 273, involves perforating the rigid reinforcement over its entire surface in order to let the foam pass fully through. This solution has the drawback that making openings in the reinforcement inevitably causes an at least local reduction in the stiffness of the reinforcement. In the case of fiber reinforcements, the cutouts made in the reinforcement hence destroy the continuity of certain fibers, and therefore reduce the overall strength of the reinforcement.

It is an object of the invention to be able to use reinforcements whose height is optimized in order to provide the board with a specific stiffness. It is also an object to let the reinforcement retain its intrinsic properties, so as to influence the stiffness of the board in the desired way.

Description of the Invention

The invention therefore relates to a gliding board which, in the known way, includes:

- an injected polyurethane foam core;
- lateral reinforcing elements, which form some or all of the edges of the board;
- at least one internal reinforcement, which is in the form of a solid layer;
- two outer layers, namely a lower one that forms the gliding surface and an upper one that forms the protective layer of the board.

According to the invention, this board is one wherein the internal reinforcement rests on recesses which are provided for this purpose in each of the lateral reinforcing elements. This internal reinforcement also has notches on its side profiles so that, level with said notches, the injected core passes through it in order to at least partially occupy the volume defined between the internal reinforcement and at least one of the outer layers.

In other words, the characteristic reinforcement extends over the entire width of the board, except for the notched zones that establish

communication between the volumes defined above and below the reinforcement so as to allow the foam to circulate as it expands during the formation of the core.

5 It is therefore possible to arrange the reinforcement at a precise height, which is calculated as a function of the mechanical characteristics required by the board.

10 Furthermore, by allowing the polyurethane foam to spread out, in particular above the reinforcement by passing through its peripheral parts, it is possible to provide the upper shape of the board with a configuration that is not flat, with great freedom in terms of the various volumes, protuberances and other
15 recesses which it may be desirable to produce. The characteristic reinforcement is not deformed by the presence of these various additional volumes, and therefore retains all of its mechanical characteristics.

20 It is thus possible to arrange the reinforcement either in the upper part or in the lower part of the core. When the point of injection lies below the reinforcement, this foam hence spreads out by passing above the reinforcement and fills the volume
25 lying below the protective upper layer. When the point of injection lies above the reinforcement, conversely, the polyurethane foam spreads out and expands by passing below the reinforcement and by coming in contact with the gliding surface.

30 Advantageously, the notches made in the reinforcement may in practice be longitudinally offset from one side of the reinforcement to the other, so that the latter retains a sufficient minimum width in order to maintain an intended rigidity. The
35 reinforcement is thus held on either one side or the other over its entire length, which prevents it from being deformed upward or downward.

In practice, the internal reinforcement may interact with the lateral reinforcing elements at various levels.

For instance, the reinforcement may rest on a recess forming a shoulder made either in the upper part or in the lower part of the lateral reinforcing element, or alternatively in a groove-shaped recess made at an intermediate level on the inner face of the lateral element.

In the case in which the reinforcement rests in a recess on an upper part of the lateral reinforcing element, it may experience contact with the protective upper layer from above.

In practice, the internal reinforcement may vary widely in nature, and may in particular be based on a laminated fiber material or alternatively a metallic material.

As mentioned above, the invention also relates to a method for manufacture by injection or molding of a gliding board that conventionally includes lateral reinforcing elements, which form some or all of the edges of the board, outer layers forming the gliding surface and the protective upper layer, as well as at least one internal reinforcement. The method involves a step of in-situ injecting components that chemically react to produce a foam which expands with a view to forming the core of the board. The method according to the invention is one wherein the internal reinforcement is immobilized in recesses, made for this purpose in the lateral reinforcing elements, when the various constituent elements of the board are being fitted in the mold.

This internal reinforcement has lateral notches that establish communication between the volumes defined above and below the reinforcement so as to allow the foam to circulate as it expands during the formation of the core.

Brief Description of the Figures

The way in which the invention is embodied, and the advantages that result therefrom, will become readily apparent from the following description of the embodiment, supported by the appended figures in which:

Figure 1 is a top view of an internal reinforcement according to the invention.

Figure 2 is a summary perspective view illustrating the way in which some of the constituent elements of a ski are fitted in the manufacturing mold.

Figure 3 is a view in cross section of the ski illustrated in Figure 2, just before the injection operation.

Figure 4 is a view in cross section of a ski produced according to an alternative embodiment.

Embodiment of the Invention

As already mentioned, the invention is based on the integration of a characteristic reinforcement inside a gliding board, Figure 1 constituting an example of the geometry of this reinforcement.

Such a reinforcement has a width substantially equal to that of the board, and a length which corresponds to the length over which it is intended to extend along the ski.

This reinforcement (1) has multiple notches (2, 3) which are distributed on each of the sides of the reinforcement and are separated by straight portions (4, 5). In practice, these notches (2, 3) have a length L of the order of from 15 to 60 mm, and a length l of the order of a few millimeters, typically from 2 to 6 mm in width.

In the form which is illustrated, the notches (2, 3) are arranged on either side of the reinforcement and are offset with respect to one another so that the width of the reinforcement is reduced only by the width of a single notch.

The reinforcement is installed as illustrated in Figures 2 and 3. Hence, the various elements constituting the lower assembly of the board, namely

the gliding surface (11) as well as the edges (12), are placed in a mold base (10). Various reinforcements may be installed directly above the gliding surface, without interfering with the present invention.

5 The reinforcing elements (13, 14) are subsequently placed above the edges (12), at the border of the compartment of the mold (10). In the form which is illustrated, these reinforcing elements also have fins (15) allowing them to be locked in position in the
10 mold.

Characteristically, these reinforcing elements have a recess made level with their upper inner corner. This recess (16) forms a shoulder on which the peripheral part (4, 5) of the reinforcement (1) can
15 rest.

The notches (3) of the reinforcement (1) define a passage between the volume (20) lying below the reinforcement (1) and the volume (21) lying above.

This upper volume is bounded by a protective
20 upper layer (23). It can be seen that the lid of the mold (18) has recesses making it possible to define the protuberances (26, 27) on the board. When the various constituents that react to form the polyurethane foam are injected, they spread out by propagating through
25 the volume (20) lying below the reinforcement (1) and by passing through the various notches (2, 3) into the upper volume (21), so as to press the protective layer (23) against the bottom of the lid of the mold. The reinforcement (1) is held in position by virtue of the
30 fact that it experiences contact with the protective upper layer at the level of the reinforcing elements (13, 14).

According to an alternative embodiment which is illustrated in Figure 4, the reinforcement (1) is
35 positioned at an intermediate level of the height of the board. In order to do this, it is installed inside grooves (36) in which the flat portions (4, 5) can be integrated. In this case, when the injection is carried out either above or below the reinforcement, the

passage (37) permits communication between the lower and upper volumes (30, 31), and therefore uniform distribution of the polyurethane foam.

5 It can be seen from the explanation above that
the boards according to the invention offer the
advantage of having reinforcements which are positioned
optimally at the height necessary in order to provide
the desired rigidity. The presence of these
reinforcements nevertheless allows the polyurethane
10 foam to pass through, which makes it possible to
produce widely varied volumes and shapes level with the
upper face of the board, without degrading the
mechanical performance of the reinforcement.